IN THE CLAIMS:

Please amend claims 1, 4, and 23 as follows. All claims now pending are provided below according to current U.S. Patent and Trademark Office practice.

1. (Currently Amended) An image reading imaging optical system for imaging image information on a line sensor and reading the image information, the system comprising: ~~having (i)~~

an image optical element including a plurality of off-axial reflecting surfaces differing in the direction of incidence and the direction of emergence of a reference axis ray from one another and having curvatures, and ~~(ii)~~

an angle of field, wherein the angle of field is an angle defined between a principle ray of an off-axis light beam and a principle ray of an on-axis light beam.

2. (Previously Presented) An image reading imaging optical system according to Claim 1, wherein said imaging optical element has the function of changing the direction of emergence of the reference axis ray to a direction substantially perpendicular or opposite to the direction of incidence of the reference axis ray.

3. (Previously Presented) An image reading imaging optical system according to Claim 1 or 2, wherein the plurality of off-axial reflecting surfaces include at least one set of reflecting surfaces intersecting with each other, and a stop is located between the off-axial reflecting surfaces intersecting with each other.

4. (Currently Amended) An image reading apparatus comprising:

an original supporting table on which an original is placed;

an imaging optical element for imaging image information on the surface of the original on a line sensor; and

a line sensor for reading the image information,

wherein said imaging optical element has a plurality of off-axial reflecting surfaces differing in the direction of incidence and the direction of emergence of a reference axis ray from one another and having curvatures, and

wherein the apparatus has an angle of field, wherein the angle of field is an angle defined between a principle ray of an off-axis light beam and a principle ray of an on-axis light beam.

5. (Previously Presented) An image reading apparatus according to Claim 4, wherein the bending direction of the reference axis ray on each off-axial reflecting surface of said imaging optical element is in a cross section perpendicular to the line direction of said line sensor.

6. (Cancelled)

7. (Previously Presented) An image reading apparatus according to Claim 5, wherein the direction of the reference axis ray emerging from said imaging optical element is substantially orthogonal to the direction of the reference axis ray incident on said imaging optical element.

8. (Previously Presented) An image reading apparatus according to Claim 5, wherein the direction of the reference axis ray emerging from said imaging optical element is substantially the same direction as the direction of the reference axis ray incident on said imaging optical element.

9. (Previously Presented) An image reading apparatus according to Claim 5 wherein the direction of the reference axis ray incident on said imaging optical element and the direction of the reference axis ray emerging from said imaging optical element are substantially opposite directions.

10. (Previously Presented) An image reading apparatus according to Claim 4, wherein said image information is not intermediately imaged in said imaging optical element, but is directly formed on said line sensor.

11. (Previously Presented) An image reading apparatus according to Claim 10, wherein said imaging optical element has a stop near substantially the center of the optical path between a light incidence surface and a light exit surface thereof.

12. (Previously Presented) An image reading apparatus according to Claim 11, wherein the stop is formed by an effective surface of an off-axial reflecting surface located near substantially the center of the optical path between the light incidence surface and the light exit surface of said imaging optical element.

13. (Previously Presented) An image reading apparatus according to Claim 4, wherein an internal medium constituting said imaging optical element is air.

14. (Previously Presented) An image reading apparatus according to Claim 4, wherein an internal medium constituting said imaging optical element is optically transparent glass or plastic.

15. (Previously Presented) An image reading apparatus according to Claim 5, wherein when an off-axial reflecting surface for counter-clockwisely deflecting the reference axis ray is defined as a plus deflecting surface, and an off-axial reflecting surface for clockwisely deflecting the reference axis ray is defined as a minus deflecting surface, said imaging optical element has at least one set of constructions in which the plus deflecting surface is continuous or at least one set of constructions in which the minus deflecting surface is continuous.

16. (Previously Presented) An image reading apparatus according to Claim 5, wherein when an off-axial reflecting surface for counter-clockwisely deflecting the reference axis ray is defined as a plus deflecting surface, and an off-axial reflecting surface for clockwisely deflecting the reference axis ray is defined as a minus deflecting surface, said imaging optical element has at least one set of constructions in which the plus deflecting surface is continuous and at least one set of constructions in which the minus deflecting surface is continuous.

17. (Previously Presented) An image reading apparatus according to Claim 5, wherein said imaging optical element is comprised of six off-axial reflecting surfaces, and when an off-axial reflecting surface for counter-clockwisely deflecting the reference axis ray is defined as a plus deflecting surface, and an off-axial reflecting surface for clockwisely deflecting the reference axis ray is defined as a minus deflecting surface, said imaging optical element has the same number of plus deflecting surfaces and minus deflecting surfaces, and the off-axial reflecting surface most adjacent to the exit side is disposed on the original side on the incidence reference axis relative to the off-axial reflecting surface most adjacent to the incidence side.

18. (Previously Presented) An image reading apparatus according to Claim 17, wherein the plus deflecting surfaces and the minus deflecting surfaces are disposed so as to be opposite deflecting surfaces relative to a stop.

19. (Previously Presented) An image reading apparatus according to Claim 17, wherein an off-axial reflecting surface of said imaging optical element which is most adjacent to the incidence side is designed to have a converging action.

20. (Previously Presented) An image reading apparatus according to Claim 17, wherein at least one off-axial reflecting surface of said imaging optical element cuts infrared light.

21. (Previously Presented) An image reading apparatus according to Claim 17, wherein said imaging optical element is disposed in a housing along the surface of the original in parallel to a reflecting mirror.

22. (Previously Presented) An image reading apparatus according to Claim 4, wherein when an effective beam width in a direction perpendicular to the line direction of the line sensor on the exit surface of said imaging optical element is defined as Φs, and an effective beam width in the line direction of the line sensor is defined as Φm,

$\Phi s < \Phi m$.

23. (Currently Amended) An image reading apparatus comprising:

an original supporting table on which an original having image information on a surface thereof is placed;

an imaging optical element for causing the image information on the surface of the original to be imaged on a line sensor, the imaging optical element having a plurality of off-axial reflecting surfaces differing in the direction ~~directio~~ of incidence and the direction of emergence of a reference axis ray from one another and having curvatures;

a line sensor for reading the image information; and

a reflecting mirror,

wherein said reflecting mirror and said imaging optical element reflect the reference axis ray a plurality of times, and said imaging optical element has the function of changing a direction of emergence of the reference axis ray to a direction substantially perpendicular or opposite to the direction of incidence of the reference axis ray, and

wherein the apparatus has an angle of field, wherein the angle field is an angle defined between a principle ray of an off-axis light beam and a principle ray of an on-axis light beam.

24. (Canceled)

25. (Previously Presented) An image reading apparatus according to Claim 23 wherein the bending direction of the reference axis ray on each off-axial reflecting surface is in a cross section perpendicular to a line direction of said line sensor.

26. (Previously Presented) An image reading apparatus according to Claim 23 further comprising at least two reflecting mirrors.

27. (Previously Presented) An image reading apparatus according to Claim 23 wherein said imaging optical element is disposed on the side opposite to the surface of the original with respect to said reflecting mirror.

28. (Previously Presented) An image reading apparatus according to Claim 23 wherein said imaging optical element is disposed in a housing along the surface of the original in parallel to said reflecting mirror.

29. (Previously Presented) An image reading apparatus comprising:

an original supporting table on which an original is placed;

an imaging optical element for imaging image information on the surface of the original on a line sensor, said imaging optical element including a plurality of off-axial reflecting surfaces including at least one set of reflecting surfaces intersecting with each other and a stop between the off-axial reflecting surfaces intersecting with each other; and

a line sensor for reading the image information.

30. (Previously Presented) An image reading apparatus according to Claim 29, wherein the bending direction of a reference axis ray on each off-axial reflecting surface of said imaging optical element is in a cross section perpendicular to the line direction of said line sensor.

31. (Previously Presented) An image reading apparatus according to Claim 30, wherein the stop in said imaging optical element is disposed near substantially the center of an optical path between the light incidence surface and the light exit surface of the imaging optical element.

32. (Previously Presented) An image reading apparatus according to Claim 30, wherein the stop differs in an aperture width thereof in a cross section perpendicular to the line direction of the sensor line and an aperture width in a direction parallel to the line direction.

33. (Previously Presented) An image reading apparatus according to Claim 32, wherein the stop is constructed integrally with the off-axial reflecting surfaces proximate thereto.

34. (Previously Presented) An image reading apparatus according to any one of Claims 4, 5, 7 to 23, or 25 to 33, wherein said image information is a color image.

35. (Previously Presented) An image reading apparatus comprising:

an original supporting table on which an original is placed;

an imaging optical element for imaging image information on the surface of the original on a line sensor; and

a line sensor for reading the image information,

wherein said imaging optical element has a plurality of off-axial reflecting surfaces differing in the direction of incidence and the direction of emergence of a reference axis ray from one another and having curvatures,

wherein the bending direction of the reference axis ray on each off-axial reflecting surface of said imaging optical element is in a cross section perpendicular to the line direction of said line sensor, and

wherein the direction of the reference axis ray emerging from said imaging optical element is substantially orthogonal to the direction of the reference axis ray incident on said imaging optical element.

36. (Previously Presented) An image reading apparatus comprising:

an original supporting table on which an original is placed;

an imaging optical element for imaging image information on the surface of the original on a line sensor; and

a line sensor for reading the image information,

wherein said imaging optical element has a plurality of off-axial reflecting surfaces differing in the direction of incidence and the direction of emergence of a reference axis ray from one another and having curvatures,

wherein the bending direction of the reference axis ray on each off-axial reflecting surface of said imaging optical element is in a cross section perpendicular to the line direction of said line sensor, and

wherein the direction of the reference axis ray emerging from said imaging optical element is substantially the same direction as the direction of the reference axis ray incident on said imaging optical element.

37. (Previously Presented) An image reading apparatus comprising:

an original supporting table on which an original is placed;

an imaging optical element for imaging image information on the surface of the original on a line sensor; and

a line sensor for reading the image information,

wherein said imaging optical element has a plurality of off-axial reflecting surfaces differing in the direction of incidence and the direction of emergence of a reference axis ray from one another and having curvatures,

wherein the bending direction of the reference axis ray on each off-axial reflecting surface of said imaging optical element is in a cross section perpendicular to the line direction of said line sensor, and

wherein the direction of the reference axis ray incident on said imaging optical element and the direction of the reference axis ray emerging from said imaging optical element are substantially opposite directions.

38. (Previously Presented) An image reading apparatus comprising:

an original supporting table on which an original is placed;

an imaging optical element for imaging image information on the surface of the original on a line sensor; and

a line sensor for reading the image information,

wherein said imaging optical element has a plurality of off-axial reflecting surfaces differing in the direction of incidence and the direction of emergence of a reference axis ray from one another and having curvatures, and

wherein said imaging optical element has a stop near substantially the center of the optical path between a light incidence surface and a light exit surface thereof.

39. (Previously Presented) An image reading apparatus according to Claim 38, wherein the stop is formed by an effective surface of an off-axial reflecting surface located near substantially the center of the optical path between the light incidence surface and the light exit surface of said imaging optical element.

40. (Previously Presented) An image reading apparatus comprising:

an original supporting table on which an original is placed;

an imaging optical element for imaging image information on the surface of the original on a line sensor; and

a line sensor for reading the image information,

wherein said imaging optical element has a plurality of off-axial reflecting surfaces differing in the direction of incidence and the direction of emergence of a reference axis ray from one another and having curvatures,

wherein the bending direction of the reference axis ray on each off-axial reflecting surface of said imaging optical element is in a cross section perpendicular to the line direction of said line sensor, and

wherein said imaging optical element is comprised of six off-axial reflecting surfaces, and when an off-axial reflecting surface for counter-clockwisely deflecting the reference axis ray is defined as a plus deflecting surface, and an off-axial reflecting surface for clockwisely deflecting the reference axis ray is defined as a minus deflecting surface, said imaging optical element has the same number of plus deflecting surfaces and minus deflecting surfaces, and the off-axial reflecting surface most adjacent to the exit side is disposed on the original side on the incidence reference axis relative to the off-axial reflecting surface most adjacent to the incidence side.

41. (Previously Presented) An image reading apparatus according to Claim 40, wherein the plus deflecting surfaces and the minus deflecting surfaces are disposed so as to be opposite deflecting surfaces relative to a stop.

42. (Previously Presented) An image reading apparatus according to Claim 40, wherein an off-axial reflecting surface of said imaging optical element which is most adjacent to the incidence side is designed to have a converging action.

43. (Previously Presented) An image reading apparatus according to Claim 40, wherein at least one off-axial reflecting surface of said imaging optical element cuts infrared light.

44. (Previously Presented) An image reading apparatus according to Claim 40, wherein said imaging optical element is disposed in a housing along the surface of the original in parallel to a reflecting mirror.

45. (Previously Presented) An image reading apparatus according to any one of Claims 35 to 44, wherein said image information is a color image.